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CHARACTERISTICS OF THE TECHNICAL EDUCATION STUDENT.

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THE POST-HIGH SCHOOL TRAINEE SHOULD BE A HIGH SCHOOL GRADUATE OR THE EQUIVALENT. A FAIR DEGREE OF PROFICIENCY IN MATHEMATICS AND SCIENCE IS REQUIRED. IT IS REASONABLE TO EXPECT THE COMPLETION OF 2 YEARS OF HIGH SCHOOL MATHEMATICS AND 1 YEAR OF HIGH SCHOOL SCIENCE. SOME BACKGROUND IN DRAFTING AND SHOP IS DESIRABLE. THE STUDENT SHOULD BE AVERAGE OR ABOVE IN INTELLIGENCE. BECAUSE OF THE NATURE AND LENGTH OF THE TECHNICAL CURRICULUM, THE STUDENT MUST BE WILLING AND ABLE TO COMMIT HIMSELF TO IT IMMEDIATELY UPON ENROLLING. IF HE TRANSFERS FROM ANOTHER CURRICULUM, HIS REASONS SHOULD BE POSITIVE RATHER THAN NEGATIVE. READING ABILITY HAS BEEN FOUND TO BE THE MOST SIGNIFICANT ACADEMIC SUCCESS FACTOR. A STUDY BY THE AUTHOR REVEALED THAT TECHNICAL STUDENTS CAME FROM SIGNIFICANTLY LOWER SOCIOECONOMIC BACKGROUND THAN ENGINEERING STUDENTS. THE DROPOUT TENDED TO BE AN EXCESSIVE CONFORMIST WHO HAD DIFFICULTY IN DISAGREEING WITH OTHERS. HE TENDED TO BE EXCESSIVELY DEPENDENT ON OTHERS. THIS SPEECH WAS PRESENTED AT THE AMERICAN TECHNICAL EDUCATION ASSOCIATION (DENVER, DECEMBER 4, 1966). (EM)

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CHARACTERISTICS OF THE TECHNICAL EDUCATION STUDENT

In discussing most any facet of technical education there seems to be one abiding problem. That problem is trying to specifically define technical education. I certainly don't intend to fall into that pit or to open any old wounds here this evening by rigidly classifying technician types of jobs. However, before we can identify certain general characteristics of the technical education student, we must set certain boundary conditions by briefly defining technical education. In other words, we need to identify the breed before we can discuss the animal.

Probably one of the best definitions of technical education is taken from a draft of the U. S. Office of Education's Cooperative Project for Standardization of Terminology. Paraphrased, that definition states: technical education is concerned with a planned and integrated sequence of classroom and laboratory experiences that prepare a student for a cluster of jobs in some field of technology. This program is generally of post-high school level and its curriculum is based on the knowledge of mathematics and science associated with that field of technology. The program prepares

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the technician who works between the professional employee and the skilled employee. Having structured our frame of reference, (or identified the breed) let's examine some of the characteristics of typically successful technical students.

Technician training programs are found at both the high school and post high school levels. Both levels of training are important parts of the total effort. However, because the majority of technician training programs in existence today are at the post high school level, and because the demands of the curriculum are at the college level, this discussion of the technical education student will be restricted to the post high school trainee.

As the kind of program we're talking about is college level, the technical student should be a high school graduate or equivalent. Equivalency, of course, varies with institutions, and is generally extablished by passing some type of high school equivalency examination.

Numerous studies, both formal and informal, have indicated the entering technical institute students' need for a fair degree of proficiency in mathematics and science. This is typically demonstrated by the significant relationship between success in a technical institute program and mathematics aptitude as was found to exist by Righthand (5) in his study of technical

institute students in Connecticut. This clearly established need for a minimum math-science competency level in entering technical institute students was earlier documented in such studies as the criteria document of the American Society for Engineering Education which was entitled Characteristics of Excellence in Engineering Technology Education (2). It therefore seems only reasonable that the entering technical student should have completed a minimum of two years (standard secondary units) of high school mathematics, preferably one year of algebra and one year of plane geometry. In addition, he should have completed one year of a laboratory science, preferably chemistry or physics. However, one unit of high school biology may be most helpful as a prerequisite for a biological science oriented technology. Successful completion of additional courses in mathematics and science in high school seems to greatly enhance the student's chance of success in most post-high school technical curricula. Some background in basic drafting and shop skills is highly desirable. These skills are frequently gained through industrial arts courses.

So far, the description of this technical student might be interpreted to include only the academically talented--the superior student. This, of course, is not the case. All of us would certainly prefer to have nothing

but "students" (in the academic sense) in our classes, but every facet of education seeks these people. However, the technical education student must be a reasonably capable youngster who is average or above average in intelligence. To enroll students who are either ill prepared for or do not have the basic cognitive skills for a technical level program will generally result in one of two outcomes; either the students will fail or the minimum standards of the instructional program will be lowered to accommodate the students. Neither of these alternatives should be acceptable.

It should be recognized, at this point, that because of improper motivation in high school a person's high school transcript does not always reflect his true potential as a technician. This person may even profess a disinterest in mathematics and science--at least the kind to which he may have been exposed in high school. However, one characteristic must be present in the student. He must have an intense interest in the specialized field of technology he wishes to pursue.

The reason for the absolute necessity of the technical student's interest in a specialized field of technology lies in the structure of the technical education program itself. For example, in most college level programs, it is not necessary for the student to declare a "major" until after the first year or sometimes the second year of study. In a professional engineering program,

it is many times possible for a person to complete his first two years of pre-engineering without making a final decision with regard to the specific field of engineering that he wishes to pursue. However, because of the highly specialized and accelerated nature of the two year technology program, a technical student must decide at the beginning of the program the kind of technology in which he wishes to specialize. He can't afford the luxury of delaying his decision for several years.

The successful technical student may be a transfer from some other college program or perhaps an engineering college dropout. Many of these kinds of students have had false starts because of improper counseling, lack of motivation, lack of maturity, or for any number of reasons. In many cases, the student who has not succeeded in a professional engineering program may do quite well in a technical education program. However, his reasons for transferring into a technical program should be positive reasons and not negative reasons. It may be that the student now realizes his limitations in the area of higher mathematics and the abstract cognitive skills necessary in a professional engineering or science program. It may be that he finds his interest is in the area of equipment fabrication and the manipulation of laboratory instruments. That is, he wants a more practical program which involves practical laboratory applications of

theory as is found in a technician training program.

There are certain intellective factors which must be present in the technical institute student for him to reasonably expect successful completion of a program. These factors, however, are not necessarily unique in technical institute students. The first important factor is a certain interest and ability in the application of both mathematics and science to the field of technology in which he finds his interest. After all, this is the foundation of a technical education program. Without this basic interest, this student should be counseled into a different type of academic pursuit.

Another essential ingredient is a basic minimal reading ability. The importance of reading ability has been verified in a number of studies which relate academic achievement at the post-high school level to reading ability. In one typical study by Brown (1), certain selected intellective factors such as abilities im mathematics, science and reading were related to success in a post-high school technical institute program. In this study, reading ability was found to be a far more significant predictor of success than any other single academic factor.

Let us now examine some of the personal characteristics that typify the successful technical institute student. A recent study of technical institute students and professional engineering students relative to social

class background was conducted at Oklahoma State University by Miller (4). In this study, social class background was based upon father's education, father's occupation, and family income. This investigation revealed that the technical institute students came from significantly lower socio-economic backgrounds than the engineering students. However, upon following the progress of these students in their respective programs, it was interesting to note that the factor of social class background became insignificant when related to successful completion of either a technical institute or engineering program. The difference in socio-economic backgrounds of the two groups could indicate that the choice of a four-year engineering program rather than a two-year technical institute program was influenced by the income of the parents, or more directly, the parents' ability to pay for two additional years of college.

Further study of these groups relative to psychological needs revealed a significantly greater expressed need for achievement in the engineering students. This, however, is not surprising as it reinforces the earlier research findings of Hyman (3) who showed that parents from higher socio-economic groups emphasize college training to their children to a much greater degree than parents from lower socio-economic groups; thus, it again appears that parents who are able to afford the expense of a college

program of greater duration, emphasize the importance of college training, and endeavor to motivate their children toward a baccalaureate degree program.

In this same investigation, the technical institute students were studied in terms of their personal values and non-intellective psychological factors to identify any significant differences in these personality variables among technical institute students who successfully completed their two year program and those technical institute students who dropped out of the program. In this study, the student who persisted in his program displayed nurturance type needs to a much lower degree than those technical institute students who dropped out. That is, the successful student was one who was detached from an excessive need for others. He relied primarily on his own interpretations of situations and not on the interpretations of others. He required a certain amount of privacy from others and was, to a large degree, independent of the feelings of others. This successful student might be described as "things" oriented rather than "people" oriented.

On the other hand, the technical institute dropout was one with an excess of nurturance type needs. That is, he tended to be an excessive conformist who had great difficulty in disagreeing with others. He tended

to be dependent on the help of others far in excess of necessity. This technical institute dropout might be described as "people" oriented rather than "things" oriented.

Technician training institutions vary with regard to stated philosophy, objectives, admission procedures; the technical students within institutions also vary. However, in trying to summarize some characteristics which generally typify successful technical institute students, I think we might all agree on these four essential factors:

(1) The technical student must be at least average in terms of academic ability.

(2) The technical student must have at least an average ability in mathematics and science with a genuine interest in the practical application of these skills to some specific field of technology.

(3) The technical student should have the maturity and personal characteristics which enable him to work for and with others.

(4) The technical student must be a person who can form judgments and function effectively without excessive reliance upon others.

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